

CLAIMS

What is claimed is:

- 5 1. A system for monitoring a region of a subject to determine a plurality of physiological characteristics of said subject wherein said region includes at least a portion of a dermal layer extending over a chin region of said subject, said chin region including at least one of the subject's mandible,
10 · symphysis, mental protuberance, or incisive fossa, comprising:
 - a sensor having at least one light emitting source and at least one detector wherein said sensor is positioned on the region being monitored; and
- 15 a securing means to position said sensor to the region being monitored.
- 20 2. The system of claim 1 wherein the sensor is a reflectance type sensor.
- 25 3. The system of claim 2 wherein the sensor further comprises a housing having an edge region wherein said detector is attached to the housing and said light emitting source is attached to the housing and substantially adjacent to the detector.
- 30 4. The system of claim 3 wherein the edge region is curved.
- 35 5. The system of claim 4 wherein the curved region substantially conforms to a contour of the region being monitored.
- 40 6. The system of claim 1 wherein the detector is in data communication with a monitor.
- 35 7. The system of claim 6 wherein the monitor is an oximeter.
- 40 8. The system of claim 1 wherein the physiological characteristics includes at least one of blood oxygenation level, blood gases, respiratory rate, and pulse rate.
- 45 9. The system of claim 3 wherein the securing means comprises a strap.

10. The system of claim 9 wherein said strap is
adjustable.
- 5 11. The system of claim 9 wherein said strap is in
physical communication with the housing.
- 10 12. The system of claim 11 wherein said strap is in
physical communication with an apparatus and wherein said
apparatus is capable of being secured to a head of the subject.
- 15 13. The system of claim 12 wherein the apparatus is
attached to a helmet.
- 20 14. The system of claim 12 wherein the apparatus is used
for at least one of a military, sporting, construction,
security, policing, and firefighting application.
- 25 15. The system of claim 1 wherein the sensor is a
transmission type sensor.
- 30 16. The system of claim 15 wherein the sensor further
comprising a housing attached to said detector and a housing
attached to said light emitting source.
- 35 17. The system of claim 15 wherein said detector and said
light emitting source are positioned to permit light emitted
from said light emitting source to pass into said region being
monitored and out to said detector.
- 40 18. The system of claim 15 wherein the light emitting
source and the detector are positioned with said region to be
monitored juxtaposed in between said light emitting source and
said detector.
- 45 19. The system of claim 15 wherein the detector is in data
communication with a monitor.
- 20 20. The system of claim 19 wherein the monitor is an
oximeter.
- 40 21. The system of claim 16 wherein the securing means
comprises an adhesive layer on said detector housing and on said
light emitting source housing.
- 45 22. The system of claim 16 wherein the securing means
comprises a first strap in physical communication with said

detector housing and a second strap in physical communication with said light emitting housing.

23. The system of claim 22 wherein said first and second straps are two separate straps positioned substantially opposite each other relative to the region being monitored.

24. The system of claim 22 wherein said first and second straps are integrally formed into a singular structure.

10 25. The system of claim 22 wherein said first straps and second straps are adjustable.

15 26. The system of claim 22 wherein said first strap and second strap are in physical communication with an apparatus and wherein said apparatus is capable of being secured to a head of the subject.

20 27. The system of claim 26 wherein the apparatus is attached to a helmet.

25 28. The system of claim 26 wherein the apparatus is used for at least one of a military, sporting, construction, security, policing, and firefighting application.

30 29. The method for monitoring a region of a subject to determine a plurality of physiological characteristics of said subject wherein said region includes at least a portion of a dermal layer extending over a chin region of said subject, said chin region including at least one of the subject's mandible, symphysis, mental protuberance, or incisive fossa, comprising the steps of:

35 securing a sensor having at least one light emitting source and at least one detector to the region being monitored; emitting light from said light emitting source wherein said light emitting source is positioned proximate to the region being monitored; and

40 detecting light from the surface of the region being monitored using the at least one detector, wherein said detector is proximate to the region being monitored.

45 30. The system of claim 29 wherein the sensor is a reflectance type sensor.

31. The system of claim 30 wherein the sensor further comprises a housing having an edge region wherein said detector

is attached to the housing and said light emitting source is attached to the housing and substantially adjacent to the detector.

5 32. The system of claim 31 wherein the edge region is curved.

10 33. The system of claim 32 wherein the curved region substantially conforms to a contour of the region being monitored.

15 34. The system of claim 29 wherein the detector is in data communication with a monitor.

20 35. The system of claim 34 wherein the monitor is an oximeter.

25 36. The system of claim 29 wherein the physiological characteristics includes at least one of blood oxygenation level, blood gases, respiratory rate, and pulse rate.

30 37. The system of claim 31 wherein the securing means comprises a strap.

35 38. The system of claim 37 wherein said strap is adjustable.

40 39. The system of claim 37 wherein said strap is in physical communication with the housing.

45 40. The system of claim 39 wherein said strap is in physical communication with an apparatus and wherein said apparatus is capable of being secured to a head of the subject.

50 41. The system of claim 40 wherein the apparatus is attached to a helmet.

55 42. The system of claim 40 wherein the apparatus is used for at least one of a military, sporting, construction, security, policing, and firefighting application.

60 43. The system of claim 29 wherein the sensor is a transmission type sensor.

65 44. The system of claim 29 wherein the sensor further comprising a housing attached to said detector and a housing attached to said light emitting source.

45. The system of claim 29 wherein said detector and said light emitting source are positioned to permit light emitted from said light emitting source to pass into said region being
5 monitored and out to said detector.

46. The system of claim 29 wherein the light emitting source and the detector are positioned with said region to be monitored juxtaposed in between said light emitting source and
10 said detector.

47. The system of claim 29 wherein the detector is in data communication with a monitor.

15 48. The system of claim 47 wherein the monitor is an oximeter.

20 49. The system of claim 44 wherein the securing step is performed using an adhesive layer on said detector housing and on said light emitting source housing.

25 50. The system of claim 44 wherein the securing step is performed using a first strap in physical communication with said detector housing and a second strap in physical communication with said light emitting housing.

30 51. The system of claim 50 wherein said first and second straps are two separate straps positioned substantially opposite each other relative to the region being monitored.

52. The system of claim 50 wherein said first and second straps are integrally formed into a singular structure.

35 53. The system of claim 50 wherein said first straps and second straps are adjustable.

40 54. The system of claim 50 wherein said first strap and second strap are in physical communication with an apparatus and wherein said apparatus is capable of being secured to a head of the subject.

55. The system of claim 54 wherein the apparatus is attached to a helmet.

45 56. The system of claim 54 wherein the apparatus is used for at least one of a military, sporting, construction, security, policing, and firefighting application.

57. An apparatus for monitoring a dermal region of a subject, having a head, said region at least partially covering at least one of a mandible, symphysis, mental protuberance, or
5 incisive fossa to determine a plurality of physiological characteristics wherein the apparatus is securable to the head of the subject, comprising:

10 a plurality of straps; and
at least one sensor having at least one light emitting source and at least one detector attached to at least one of said straps.

58. The apparatus of claim 57 wherein the sensor is a
15 reflective type sensor.

59. The apparatus of claim 57 wherein the sensor is a transmission type sensor.

20 60. A non-invasive, electro-optical sensor for removable attachment to a dermal layer of a person wherein the sensor is used to measure physiological characteristics of the person and the dermal layer covers at least one of a mandible, symphysis, mental protuberance, or incisive fossa of the subject,
25 comprising:

a support structure having at least one substantially planar surface;

30 a light emitting source having an emission surface said emission surface being positioned in said planar surface and being exposed to an external environment;

a detector having a detection surface said detection surface being positioned in said planar surface and being exposed to an external environment; and

35 a curved edge region wherein said curved edge region substantially conforms to a contour of the dermal layer.

61. The sensor of claim 60 further comprising a divider positioned between said light emitting source and said detector.